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Does More Intense Competition Lead to Higher Growth?

Empirical evidence indicates a strong correlation between long-run growth and effective enforcement of antitrust and competition policy.

Mark A. Dutz
Aydin Hayri

The World Bank
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Summary findings

The relationship between the intensity of competition in an economy and its long-run growth is an open question in economics. Theoretically, there is no clear-cut answer.

Empirical evidence exists, however, that in some sectors more competition leads to more innovation and accelerates productivity growth.

To complement those findings and capture economywide effects, Dutz and Hayri conduct a cross-country study. They examine the impact on growth of various measures having to do with intensity of domestic competition — beyond the effects of trade liberalization.

Their results indicate a strong correlation between long-run growth and effective enforcement of antitrust and competition policy.

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Does More Intense Competition Lead to Higher Growth? *

Mark A. Dutz
The World Bank and EBRD

Aydin Hayri
Deloitte & Touche LLP

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I. Introduction

Whether the intensity of domestic competition beyond trade liberalisation has a positive influence on economic growth is an open question, both theoretically and empirically. The existing theoretical work does not provide a clear-cut answer to whether a monopolist's higher tendency to innovate is outweighed by the productivity gains induced by competition (see Rey 1997 for a survey of this literature, and Aghion and Howitt 1998 for a recent theoretical treatment). A number of studies have attempted to settle this issue by using industry or firm level data: (i) increases in concentration are associated with reductions in technical efficiency (Caves and Barton 1990, Green and Mayes 1991, and Caves and Associates 1992); (ii) fewer competitors and higher average rents are associated with lower productivity growth (Nickell 1996); (iii) trade liberalisation and industrial deregulation can have positive effects on firm-level productivity (for example, Harrison 1994 on Côte d'Ivoire, LaPorta and Lopez-de-Silanes 1999 on Mexico, and Graham et al. 1983 on U.S. airline deregulation); and (iv) increases in concentration and other measures of monopoly power dampen innovative activity (Geroski 1990 and Blundell et al. 1995).

The available empirical studies fail to capture economy-wide effects. More importantly, they focus on manufacturing industries and do not include any service or network-based industries such as computer software, telecommunications, and advanced logistics services. Financial services also are increasingly assuming network characteristics as banks market others' products in addition to their own and play the role of market makers. In this paper, we adopt a more direct approach and study whether different available measures of intensity of competition at the economy-wide level are positively associated with economic development using data from over 100 countries over the ten-year period 1986 through 1995. Specifically, we investigate whether higher levels of domestic competition, while controlling for the degree of trade liberalisation, are significantly and robustly correlated with faster current and future rates of per capita economic growth rates.

The existing empirical growth literature provides the techniques for testing this kind of hypothesis using cross-country regressions (Barro 1997). Although the methodology is straightforward (see Temple 1999 for a recent evaluation of methodology), the major empirical challenge is to define and assemble on a cross-country comparable basis variables that can adequately capture the intensity of economy-wide competition. We compile and construct three types of variables related to policy, structure and mobility. First, we compile qualitative policy measures to capture the quality of the microeconomic incentive regime and the enabling legal and regulatory framework in areas that directly promote competition. Second, we compile qualitative variables and construct quantitative variables to reflect the extent to which market structure is concentrated from

an economy-wide perspective. Finally, we construct quantitative mobility variables to capture the ease with which new enterprises can enter and grow in any market. Although each competition indicator has shortcomings, this array of measures provides a richer picture of intensity of competition at the economy-wide level than using only a single measure.

We develop as robust a testing methodology as possible, given that we have fewer observations of our competition variables than of the more standard growth variables. The smaller subset of countries that each competition indicator covers also varies. Our analysis proceeds in three steps. First, we build parsimonious growth models using core variables on which there is agreement in the literature. We require that the explanatory variables included in these models pass a test based on an extreme-bounds analysis (EBA) as in Levine and Renelt (1992). The second step is to study the strength of the partial correlation of our competition variables with unexplained growth from the growth models. Finally, the third step is to test the robustness of these partial correlations using a modified EBA procedure.

We find that key measures related to intensity of economy-wide competition are positively associated with unexplained growth. Most importantly, after controlling for the traditional fragility in growth models, we find that one policy measure, namely whether antitrust or antimonopoly policy is perceived as effectively promoting competition, has a reliable, independent and robust statistical relationship with unexplained growth. This variable is particularly appealing because it captures the effectiveness of implementation of competition policy as perceived by key local market participants.

II. Indicators of Intensity of Economy-Wide Competition

We begin our analysis by compiling and constructing as many as possible relevant quantitative and qualitative variables that may, however imperfectly, capture intensity of competition at the economy-wide level. We classify such measures into three categories. The variables and the data sources are described in Table 1.

Competition policy variables. A first set of measures captures the quality of the microeconomic incentive regime and the enabling legal and regulatory framework in areas that directly promote economy-wide competition. These measures are indirect measures of intensity of competition, in the sense that they reflect relevant policy input rather than any directly resulting intensity of competition output. We have identified seven cross-country comparable policy variables that reflect economy-wide competition beyond trade liberalisation. The most promising policy indicator, since it is most directly related to the effectiveness of competition policy, is a qualitative variable that we call ANTITRUST. This variable is based on direct responses from over 3,000 top business

executives of large international and domestic firms in 53 countries to the question: "Does anti-trust or anti-monopoly policy in your country effectively promote competition?" This variable became first available in 1996, based on an overhaul of the former IMD and World Economic Forum World Competitiveness Report.[1]

A second related indicator is provided by the qualitative variable UNFAIR. This variable is based on a somewhat different question: "Do anti-trust laws prevent unfair competition in your country?" We use the 1989-1996 average for this indicator. The shortcoming of this question as posed is that 'unfair competition' might mean predation against cash-constrained rivals, but also might allude to pressure on a less efficient enterprise applied by a more efficient rival (with possible overtones of deceptive advertising-style consumer protection, employment protection or even anti-dumping style protection against lower priced foreign products). To the extent that respondents impute the latter types of meaning to 'unfair competition', the indicator may fail to reflect the intensity of competition or effectiveness of anti-trust policies.

We considered three other policy indicators. PCONTROL refers to the extent to which price controls are used throughout the economy on various goods and services. Variables BUSFREE1 and BUSFREE2 reflect different tabulations of responses to the question: "Are businesses and co-operatives free to compete?'

Finally, we included two intensity of competition policy variables constructed on the basis of confidential internal assessments by World Bank country economists. DISTRIBUTION_WB reflects the extent of pro-competition marketing and public procurement policies; PRODUCT_WB reflects the extent that pro-competition product market policies and anti-competitive behaviour by enterprises is strictly checked by a fully effective competition policy. The appeal of these indicators is that they not only reflect the judgement of economists working closely on specific countries but also a careful effort to achieve internal consistency in rankings across countries.

Structural variables. A second set of qualitative and quantitative variables reflects the extent to which market structure is concentrated from an economy-wide perspective. It is problematic to construct cross-country comparable industry concentration measures in light of cross-country differences in relevant market definition, technology, multi-market contact and diversification of large companies, not to mention the overwhelming data collection requirements. Given these data challenges, the most informative variable may well be a qualitative variable, MRKTDOM, which is based on answers from

[1] Under the guidance of Professor Sachs of Harvard University, the traditional annual World Competitiveness Report (WCR) variables were revised in 1996, and resulted in the compilation of a new Global Competitiveness Report series published by World Economic Forum. The ANTITRUST variable appears for the first time in this new publication. The original WCR was renamed World Competitiveness Yearbook, and is now published exclusively by IMD.

business executives to the question "Do you agree that market dominance by a few companies is not common in your country?" To the extent that this indicator is negatively associated with economy-wide concentration, it is expected to be positively associated with competition and growth. The advantage of such a qualitative variable is that it incorporates the country-specific judgement of high-level executives regarding the relevant size of markets, the actual degree of market power facilitated by cross-company industrial-financial and service sector ownership links, and other difficult to quantify local factors.[2]

The extent of direct state involvement in the economy is generally expected to be positively associated with economy-wide market concentration, as state-owned enterprises usually hold exclusive monopoly franchises or often have advantages such as soft budget constraints to pre-empt entry. We use two different measures of the relative size of the state-owned sector as of 1985—SOE1 and SOE2.[3]

Finally, in spite of all the conceptual and data limitations involved, we attempted to construct cross-country comparable economy-wide concentration ratios. In order to ensure consistency of data collection across countries, we based the indicators on a recently available international company database produced by Dun & Bradstreet, Principal International Businesses, which contains data on some 90,000 largest companies ranging all sectors of the economy and spanning all emerging market economies. This database includes companies that make annual sales figures publicly available. We calculated two economy-wide thirty-firm concentration ratios. The first variable, S30, gives the ratio of total domestic sales of the top 30 companies to GDP.[4] The second concentration variable, HERF30, is an economy-wide Herfindahl-based concentration index, the sum of squares of the total sales shares in GDP for the largest 30 firms. Unlike an average of industry-level concentration ratios, these measures take multi-market contact into account and avoid cross-country problems with the selection of representative sectors.

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[2] Nickell (1996) uses a similar indicator of the intensity of competition for individual firms based on their responses to the question "Do you have more than 5 competitors in the market for your product(s)?"

[3] SOE2 is included as an alternate measure of the size of state enterprises in the economy. In contrast to SOE1, a higher rating indicates that government enterprises play a less significant role in the economy. SOE2 is expected therefore to be positively associated with growth.

[4] Since the database does not include the value of exports for each firm, we attempted to separately collect this information by contacting local exporters association, business magazines, government statistical offices, chambers of commerce and, in some cases, the individual firms. Based on results for 20 countries, we decided to proxy domestic sales by re-scaling worldwide company sales by national exports since: (i) information on company exports was usually based on surveys conducted on a random sample of firms and not necessarily carried out every year; (ii) in some cases, company exports included both home and foreign plant production; (iii) the correlation between our proxy and the more detailed export accounting was 0.79 with a p-value of zero.

Mobility variables. A third set of measures attempts to capture enterprise mobility, that is, the ease with which new enterprises can enter and grow in any market.[5] ENTREPRENEUR is a proxy for the relative size of the entrepreneurial pool. It is defined as the share of total employers in the labour force, namely owner-managers working on their own account or with one or a few partners, making the operational decisions affecting the enterprise, and engaging one or more persons to work for them in their business. To the extent that the relative size of the pool of owner-managers reflects economy-wide ease of entry into markets (among other factors), it would be expected to be positively associated with growth.

Our second mobility indicator, AGE25, is a variable that measures the average age of 25 of the largest 30 companies by sales in each country based on the year of incorporation.[6] AGE25 should arguably be lower in countries where there exists the potential for entrepreneurs with new ideas to start a new company that if successful could become a major national player over time. Perhaps the ideal example is provided by Microsoft Inc. in the United States. To the extent that lack of competitive pressure limits turnover among the largest firms or that entry and expansion barriers prevent smaller innovative firms from growing into larger firms over time, this measure should be negatively associated with growth. As with other variables, it is important to emphasise that this measure is at best an imperfect proxy, given that incumbent large firms may successfully remain large over time in a sufficiently competitive environment by practices such as aggressively introducing new products, constantly adopting technologically cost-efficient practices and modifying their core business in response to changing demands.

III. Parsimonious but Robust Growth Models

The methodology chosen to conduct our exercise is strictly related to our *main* objective. We want to determine the impact of indicators of intensity of economy-wide competition on growth and to provide results which can be regarded as general as possible, that is, which abstract from the specific sample size chosen or from industry, sector or country-specific issues. The methodology must also adequately deal with the fact that we have fewer observations of our competition variables than of the more standard growth variables. The smaller subset of countries that each competition

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[5] Although a range of variables related to turnover exist (capturing processes of entry and exit, variations in sizes and market shares of continuing business units, and changes in the control of enterprises), considerations of data availability for a sufficiently large number of countries restricted our focus to the reported measures. On other mobility measures and links with productivity growth, see Caves (1998).

[6] Observations on the year of incorporation were missing in an apparently non-systematic manner for a small number of larger firms, which is the reason for limiting the variable to 25 of the largest 30 companies for each country.

indicator covers also varies. To deal with this problem, we developed a parsimonious but robust methodology, combining the 2-stage OLS analysis with the Extreme Bounds Analysis (EBA). Because the intensity of competition variables had not been compiled in the past, we cannot construct panel data. This further restricts our ability to use the framework of Mankiw et al. 1992. Consequently, our only alternative is to use what Temple 1999 calls "informal growth regressions," with innovative applications of the EBA. We believe that our methodology allows us to use all available information in an efficient manner.

Several issues have been thoroughly studied in the empirical literature on growth and for some of them a general agreement has been reached.[7] Table 2 describes the list of potentially important growth variables, identified by past studies, that will be used at this stage.[8] As dependent variable for all models, we use the average annual growth rate of real GNP per capita (RGNP_G) over the period 1986-95. We focus on four core explanatory variables where there appears to be a reasonable degree of consensus:

- ***Convergence***: We include the pre-period log value of real GDP or GNP per capita, in line with the findings that higher initial levels of income constrain growth possibilities, reflecting the catch-up potential by poorer nations.
- ***Openness:*** We include indices of trade openness or liberalisation, in line with the findings that a country's outward orientation and trade liberalisation enhance its growth potential.
- ***Human Capital:*** We include several variables reflecting the level of human capital accumulation, both pre- and in-period, which have been found to favour growth.
- ***Investment in Physical Capital:*** "There is a robust correlation between investment rates and growth...," Temple (1999). Accordingly, we use the share of Gross Domestic Investment in GDP as an explanatory variable.

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[7] For a survey of studies focusing on the politics of growth, income, consumption distribution and fiscal policy, see Alesina and Perotti (1997); for studies focusing on "catching-up" or mean convergence, human capital and production factor accumulation, see Barro (1991, 1997, 1998), Baumol (1986), De Long (1988), Hansson and Henrekson (1997), Jones (1995), Lucas (1988), Mankiw (1995), Mankiw et al. (1992), Romer (1990), Young (1995); for a study focusing on schooling, see Summer and Heston (1988); for studies focusing on financial development see Bencivenga and Smith (1991), Greenwood and Jovanovic (1990), King and Levine (1993), Levine (1991); for studies focusing on economic openness, see Dollar (1992), Harrison (1996), Sachs and Warner (1995).

[8] Note that some variables thought to have an important explanatory power in growth models, such as schooling-related measures, are not considered at this stage. The reason for their absence is related to the fact that the sample of these variables only partially overlaps with the other growth variables. Their use at this stage would have considerably reduced the number of countries taken into consideration, with negative effect on the efficiency of our estimates. These variables will be used later on smaller samples, when the correlation between growth and competition variables is tested.

Each one of our growth models have two "core" variables belonging to two of these four groups (see Table 2 for the definitions of variables):

Model 1 : $RGNP\_G_i = \alpha_1 + LGDP85_i\ \beta_{11} + SACWAR95_i\ \beta_{21} + u_{i1}$

Model 2 : $RGNP\_G_i = \alpha_2 + LGDP85_i\ \beta_{12} + GDI95_i\ \beta_{22} + u_{i2}$

Model 3 : $RGNP\_G_i = \alpha_3 + LGDP85_i\ \beta_{13} + LLIFEM85_i\ \beta_{23} + u_{i3}$

Model 4 : $RGNP\_G_i = \alpha_4 + SACWAR95_i\ \beta_{14} + GDI95_i\ \beta_{24} + u_{i4}$

Model 5 : $RGNP\_G_i = \alpha_5 + SACWAR95_i\ \beta_{15} + LLIFEM85_i\ \beta_{25} + u_{i5}$

Model 6 : $RGNP\_G_i = \alpha_6 + GDI95_i\ \beta_{16} + LLIFEM85_i\ \beta_{26} + u_{i6}$

To ensure parsimony, we augmented these models only with variables that passed a modified version of a robustness test based on EBA.[9] The robustness test for including variable *I* in Model *k* is conducted as follows. We add *I* and a rotating set of three other variables (denoted by ***Z***) as regressors to Model *k* above.

$$RGNP\_G_i = \alpha_k + \mathbf{X}_i\beta_k + I_i\,\beta_I + \mathbf{Z}_i\ \beta_Z + u_{ik}$$

We then run this regression with all possible sets of **Z**-variables to find the extreme bounds (i.e., maximum and minimum) for the estimate of β_I.[10] If the estimate is significant at both extreme bounds, variable *I* is considered to be a robust variable. We repeat this exercise for all six models and for all variables listed in Table 2.[11] The results are reported in Table 3. Each cell in Table 3 reports the minimum and maximum estimates of the coefficient of the variable of interest and their significance levels for the model indicated at the top of the column. Robust variables are identified by the shaded cells. For the purposes of this exercise, we used the same set of 83 observations that are common to all variables included in our investigation. We also created a seventh model by using the variables that appear in at least two of the six regressions. We report the results from these seven regression models in Table 4.

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[9] See Edward Leamer (1983) for a general discussion of EBA and Levine and Renelt (1992) for an application to cross-country growth regressions.

[10] The pool of Z-variables varies according to which model and variable of interest we are considering. For instance: when the variable of interest is POPG95 in model 4, Z variables are chosen from the following set: {LGNP85, GDFI95, LLIFET85, LLIFEF85, LFERT, LPOP85, XGDP95, MGDP95, OPEN95, BUDG95, TAX95, INFL95, GDI95, LLIFEM85, FAREAST, OIL, TRANS, LATIN, AFRICA}.

[11] We disregard results from regressions that exhibit significant multicollinearity, as evidenced by having a variance inflation factor greater than 10. Chatterjee and Price (1991) provide a definition of the variance inflation factor and a discussion for selecting a cut-off level. Although the EBA, with this screen, can potentially include more variables as being robust, the use of the screen did not have a material effect on our results.

Note that Model 4 is nested in Model 2. Moreover, it is the only model that fails the Ramsey test for functional mis-specification and the Jarque-Berra test for the normality of the residuals. We therefore disregard Model 4 for the rest of our analysis.

According to the applications of the J-test (Davidson and MacKinnon 1981) and the Cox-Pesaran-Deaton test (Pesaran and Deaton 1978) Model 1 appears to be better than Models 6 and 7; and Model 3 than Models 5, and 7. But the tests concerning other binary comparisons were inconclusive. Of these models, all explanatory variables of Model 7 are measured before the period. The only in-period variable in Models 1 and 5 is the openness variable, which reflects the reform efforts rather than ex post growth. The other models include in-period investment variables, measured as the relative intensity of investment (e.g., average investment-to-GDP ratio) rather than the absolute amount of investment. Therefore, they are not so much subject to the usual endogeneity criticism.

IV. Intensity of Competition and Unexplained Growth

Our primary aim is to study the strength of association between intensity of economy-wide competition and growth. In order to accommodate the fact that we have fewer observations of our competition variables than of the more standard growth variables and that we would like to use all available information as efficiently as possible, we test for the correlation between our competition variables and the residuals from our robust growth models.

In our attempt to utilise as much information as possible, we also have extended the growth models 1, 2 and 5 to the maximum number of available observations. This approach is justified because, as reported in Table 5, these models remain stable with respect to the extension whereas the others do not. We also have checked and report in Table 5 whether the statistical properties of all models apply to smaller sets of countries for which competition variables are available. We use these test results in evaluating the reliability of our conclusions.

In the second stage of our analysis, we test whether any of our competition variables exhibit a robust correlation with residual growth rates. As some of our qualitative competition variables arguably could reflect institutional factors not directly related to intensity of competition, we have compiled an additional list of variables that could potentially explain growth to control for such factors. These variables are described in Table 6. We include them at this stage, instead of the first stage for two reasons:

- These variables, unlike the ones used in building our parsimonious growth models, do not have as solid an established link to growth in the existing literature.
- They represent alternative hypotheses to our investigation. For example, one could argue that the ANTITRUST variable reflects general institutional quality rather than the more focused government efforts to foster competition. Were this alternative true,

we would expect the institutional quality variable, INSTITQUALITY, to exhibit as strong a link to residual growth as ANTITRUST.

Variables that appear to be correlated with unexplained growth. We report the correlation between the competition variables (and alternatives to competition variables) and residual growth in Table 7. Only correlation coefficients significant at 10 percent are shown (starred coefficients are significant at 5 percent). ANTITRUST and its earlier version, UNFAIR, appear as top performers, but they are not alone.

Competition policy variables by far exhibit the highest degree of correlation with residual growth than any other group. Besides ANTITRUST and UNFAIR, PCONTROL and DISTRIBUTION_WB are significant at the 5 percent level in at least one model. Among the structural variables, MRKTDOM and SOE2 have significant and positive correlations with residual growth, supporting the hypothesis that more competitive economies tend to have higher growth rates. Mobility variables too, despite their tentative nature, show some correlation with residual growth. These results support our belief that there should be more serious efforts to collect and compile international data on measures of corporate and entrepreneurial mobility. Two of the alternative-to-competition variables appear to have significant correlation with residual growth. One of them reflects the quality of environmental policies and regulations, and the other that of general policy making. These variables are not correlated with ANTITRUST; they probably reflect other factors than competition policy. However, in our second stage EBA analysis reported below, their correlations with residual growth are not robust.

Tests of robustness. In interpreting the correlations in Table 7, we should keep in mind the fragility of cross-country statistical relationships as noted by Levine and Renelt (1992). It is therefore important to test their robustness. We once again use the EBA, treating each variable in Table 7 as a variable of interest. We thus determine whether controlling for different sets of factors weakens the raw correlation with residual growth. The technique is similar to the one previously described with the difference that now, there are no core variables and the rotating set of "other" variables is restricted to only two variables due to sample size concerns. For each variable in Table 7, we run all possible regressions with two additional variables chosen from the pool of variables in Tables 1 and 6. The results of this EBA are reported in Table 8 where each cell shows the maximum and minimum coefficient estimate for the variable of interest and their significance levels. Only the shaded cells have both extreme bounds significant at 10 percent.

Our analysis identifies a relatively robust relationship with growth for ANTITRUST and to a lesser degree for UNFAIR and AGE25. Only the extreme bounds of these three variables remain significant at 10 percent level throughout the rotations of additional explanatory variables for at least one model. ANTITRUST and UNFAIR have robust

correlations with the residuals of models 1 and 3 which are, as discussed above, superior to models 5, 6, and 7. Moreover, models 1 and 3 could be reliably restricted to the sample size of these variables. All other associations are eliminated in our test for robustness. In particular, the variables reflecting institutional quality that had significant raw correlations with growth are not robust.

Moreover, these three variables complement one another in explaining growth: AGE25 is robust in the only model where ANTITRUST is not. In models where ANTITRUST is the most robust (models 5 and 6), UNFAIR is not robust at all. In fact, UNFAIR is the predecessor of ANTITRUST and emphasises the effectiveness of competition policy in dealing with unfair practices rather than its ability to prevent explicitly anti-competitive practices.

AGE25 is robust in only one model, Model 2, which could be reliably restricted to the sample size of AGE25. Model 2's unique feature is the absence of the Far East dummy. As we argue below, the link between competition and growth appears to be most tenuous in that region, and hence the poor showing of ANTITRUST and UNFAIR for Model 2. However, AGE25 captures the youthfulness of the leading companies in this region. For all Far East Asian countries except Philippines, AGE25 is below the sample median.

Based on these EBA findings reported in Table 8, the correlation between ANTITRUST and growth is robust. The size of the coefficient, varying between 0.28 and 0.47, implies that the link between active promotion of competition policy and growth may be economically important. Although causality cannot be inferred from our analysis, a 1-point increase in the perceived effectiveness of antitrust enforcement is associated with an increase of about 0.4 percentage points in the annual growth rate.

Causality. Not surprisingly, ANTITRUST appears with a positive and significant sign when included as an additional regressor in any of the cross-country growth regressions that we tested. Although the association between ANTITRUST and long-term growth is irrefutable, the causal link between ANTITRUST and long-term growth cannot be established in a simple regression analysis because ANTITRUST is simultaneously determined with growth. The same simultaneity problem applies to SACWAR95. An application of an instrumental variable technique for each one of the three variables provides some support for the hypothesis that each variable has a distinct causal effect on long-term growth.

For the instrumental variables approach, it is necessary to create a model with only exogenous variables except for the endogenous variable for which instruments are used. Model 7 augmented by one of the endogenous variables satisfies that requirement. Instrumental variables for the endogenous variable are selected from the categories identified in Table 2. All instrumental variables measure pre-period values (i.e., 1985) and thus are exogenous.

The best instruments for ANTITRUST appear to be terms of trade in 1985, growth in government consumption (three-year average as of 1985), and population in 1985. With these instruments, ANTITRUST retains its significance as a regressor. Using other indicators of fiscal health as instrumental variables, instead of growth in government consumption, retains the same results at somewhat weaker significance levels. A relatively advantageous foreign trade position, a large domestic market, and small government appear to be conducive to meaningful antitrust enforcement.

On the other hand, the best instruments for the trade openness index, SACWAR95, appear to be exports (as a percentage of the GDP in 1985), population growth (three-year average as of 1985), and inflation in 1985. Rather perversely, inflation appears to have positive correlation with SACWAR95. One plausible explanation would be that high inflation countries in 1985 were mostly Latin American countries that subsequently opened up their economies in the 1990s. However, after controlling for inflation and life expectancy (another significant determinant of SACWAR95), Latin American countries have lower SACWAR95 values. Considering that politics in practice appears to dominate a country's decision to open up its markets, the strange mix of these variables should not be surprising.

A closer look at individual countries. We can identify four distinct groups of relatively comparable countries for which we have ANTITRUST observations. Exploring the competition and growth link among them is instructive for understanding both the source and shortcomings of our results. Findings are reported in Table 9.

The three Latin American Southern Cone countries have the same rankings with respect to both ANTITRUST and growth residuals (Panel A). During this period, Chile was the leading reformer in Latin America, building a competitive economy through privatisation and deregulation. Other macro and trade policies moved roughly in tandem in these three countries, with Chile following a more cautious capital account liberalisation and achieving stabilisation earlier than the others. Yet all these macro factors are controlled for in the models and in the EBA analysis.

Similarly, there is almost a perfect correlation between competition and growth among the peripheral members of the European Union (Panel B). Most observers would likely agree that the Irish or the Portuguese business environment has been far more competitive than that of Greece during the period under investigation. It is reasonable to postulate that lack of competition is one of the leading explanations for Greece's sub-par growth performance.

For the group of small European economies, too, there is a very strong correlation between ANTITRUST and growth (Panel C). What is interesting is that for the so-called Asian tigers, this correlation disappears (Panel D). These findings suggest that the

effectiveness of competition policy may not be uniform across different groups of countries.

One contentious issue is whether there is any role for competition policy beyond trade liberalisation in a small open economy. We have several findings that confirm the plausibility of such a role. First, Models 1, 2, and 5 explicitly control for trade openness and their residuals still show a robust correlation with ANTITRUST. Second, alternate measures of trade openness appear in the EBA procedures and they do not appear to be weakening the correlation between growth and ANTITRUST. Third, the instrumental variables approach, discussed above, shows that ANTITRUST and SACWAR95 impact growth through different channels. Finally, the link between ANTITRUST and growth appears to be more significant for small open economies in Europe. Our findings therefore suggest a strong complementary role for competition policy in stimulating growth beyond trade liberalisation and international openness.

V. Conclusion

Despite difficulties and data problems, we have developed different sets of variables that measure the intensity of economy-wide competition. We then created traditional and robust cross-country growth models and explored the correlations between competition variables and residual growth rates.

Our results indicate that there is a strong correlation between the effectiveness of competition policy and growth. We tested the robustness of this relationship by controlling for other factors that arguably may be proxied by our competition policy variables. The relationship appears to be robust. Our analysis suggests that the effect of competition on growth goes beyond that of trade liberalisation, institutional quality, and a generally favourable policy environment. However, this link appears to be more tenuous for Far Eastern economies. This observation cautions us against being overly simplistic in promoting the importance of competition policy as a major and independent determinant of long-run growth. It suggests that there remains ample scope for further empirical work in this area. Given the tentative but promising links between mobility-related variables and growth, there should in particular be more systematic efforts to collect and compile internationally-comparable data on measures of corporate and entrepreneurial mobility.

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Table 1. Measures of Intensity of Economy-Wide Competition

	Variables	*Definition*	*Period*	*Source (1)*	*# obs.*	*Std. Dev.*	*Min*	*Max*
Competition Policy Variables	**ANTITRUST**	Anti-trust or anti-monopoly policy effectively promotes competition (2)	1996	GCR	52	0.7921	2.130	5.470
	BUSFREE1	Are businesses and co-operatives free to compete? (3)	Average 94-95	EFW	115	2.1252	2.500	10.000
	BUSFREE2	Are businesses and co-operatives free to compete? (3)	Average 94-95	FH	115	2.1344	2.500	10.000
	DISTRIBUTION_WB	State intervention in marketing and public procurement systems (4)	1997	PREM	130	0.8225	1.000	5.000
	PCONTROL	Extent of price controls on various goods and services (5)	Average 89-95	EFW	112	2.2475	0.000	9.500
	PRODUCT_WB	State intervention in product markets (6)	1996	PREM	130	0.7686	1.000	5.000
	UNFAIR	Do anti-trust laws prevent unfair competition in your country? (7)	Average 89-96	WCR/WCY	49	1.0818	2.197	6.902
	MRKTDOM	Market dominance by a few companies is not common (2)	1996	GCR	52	0.7802	2.000	5.480
Structural Variables	**S30**	Concentration ratio of top 30 firms ranked by domestic sales over GDP	1996	D&B	53	0.2297	0.009	0.932
	HERF30	Herfindahl index of top 30 firms by sales (shares of GDP)	1996	D&B	59	19.2477	0.001	87.486
	SOE1	SOE value added as % of GDP (8)	1985	WDI98	49	0.0774	0.006	0.350
	SOE2	Size of government enterprises in the economy (9)	1985	EFW	103	2.3569	0.000	10.000
Mobility Variables	**AGE25**	Average age of 25 firms within the top 30 firms ranked by total sales	1996	D&B	42	14.2192	9.000	71.160
	ENTREPRENEUR	Share of owner-managers in labour force	Average 86-91	ILO	43	0.1433	0.003	0.639

Notes:

(1) D&B: Dun & Bradstreet (1997) (with company data on largest companies by employment, based on stock exchanges, employment bureaus, ministries of labor, post offices, manufacturing censuses and surveys); EFW: *Economic Freedom of the World*, Gwartney et.al. (1997); FH: Freedom House (1996); GCR: World Economic Forum, Global Competitiveness Report (1996); ILO: International Labour Organisation (1996); PREM: Poverty Reduction and Economic Management Network, "Country Policy and Institutional Assessment", The World Bank (confidential internal assessments by staff economists, various years); WCR/WCY: IMD, *World Competitiveness Report* (to 1995)/ *World Competitiveness Yearbook* (1996); WDI98: *World Development Indicators,* The World Bank (1998).

(2) 1= strongly disagree to 7 = strongly agree

(3) The higher the rating the greater the freedom to compete (10 = countries for which businesses and cooperatives were most free to compete). EFW modified the original FH survey team ranking by reducing the rating for several countries based on EFW's substantial evidence that the FH rating was overly generous.

(4) 1 = widespread interventions with state marketing monopolies over agriculture and exports; 3 = some entry/exit barriers with reform program underway; 5 = no marketing monopolies, pro-competition public procurement system in place

(5) 0 = widespread use of price controls throughout economy; 10 = no price controls, more than 90 percent of companies can set prices freely

(6) 1 = widespread price interventions and reservation policies for selected products; 3 = progress towards price decontrol and full cost recovery for utilities, with effective implementation of competition policy; 5 = no price controls, full cost recovery, anti-competitive behavior by firms strictly checked

(7) 0 = strongly disagree to 10 = strongly agree

(8) Value added of state enterprises is estimated as their sales revenue minus the cost of their intermediate inputs, or the sum of their operating surplus and wage payments.

(9) 0 = economy dominated by SOEs (employment and output in SOEs exceeds 30% of total non-agricultural employment/output); 10 = very few SOEs, less than 1% of country's output

Table 2. Variables Used in Parsimonious Growth Models

	Variable	*Definition*	*Period*	*Source (1)*	*# obs*	*Std. Dev.*	*Min*	*Max*
long-run growth	**rgnp_g**	Real GNP per capita growth (annual %)	Average 86-95	WDI98	161	0.04	-0.14	0.09
convergence	**lgdp85**	Log of GDP per capita (constant 1987 US$)	1985	WDI98	153	1.44	4.31	10.14
	lgnp85	Log of GNP per capita (constant 1987 US$)	1985	WDI98	148	1.45	4.43	10.23
openness	**mgdp95**	Imports of goods and services (% of GDP)	Average 86-95	WDI98	172	0.26	0.04	1.77
	open95	Import plus export (% GDP)	Average 86-95	WDI98	172	0.48	0.06	3.64
	sacwar95	Sachs and Warner openess index	Average 86-93	SW	108	0.44	0.00	1.00
	xgdp95	Exports of goods and services (% of GDP)	Average 86-95	WDI98	172	0.25	0.02	1.87
human capital	**lfert85**	Fertility rate, total (births per woman)	1985	WDI98	187	0.52	0.31	2.19
	llifef85	Log of life expectancy at birth, female (years)	1985	WDI98	187	0.20	3.63	4.39
	llifem85	Log of life expectancy at birth, male (years)	1985	WDI98	187	0.19	3.55	4.31
	llifet85	Log of life expectancy at birth, total (years)	1985	WDI98	187	0.20	3.59	4.35
investment	**gdfi95**	Gross domestic fixed investment (% of GDP)	Average 86-95	WDI98	170	0.09	0.09	0.69
	gdi95	Gross domestic investment (% of GDP)	Average 86-95	WDI98	172	0.09	0.09	0.69
monetary and fiscal policy	**budg95**	Overall budget deficit, including grants (% of GDP)	Average 86-95	WDI98	128	0.05	-0.25	0.32
	infl95	Inflation, consumer prices (annual %)	Average 86-95	WDI98	140	2.71	-0.03	27.13
	tax95	Tax revenue (% of GDP)	Average 86-95	WDI98	130	0.10	0.00	0.47
population	**lpop85**	Log of population, total	1985	WDI98	200	2.11	10.52	20.77
	popg95	Population growth (annual %)	Average 86-95	WDI98	200	0.01	-0.01	0.06
dummies	**africa**	Sub-saharhan countries	Average 86-95		209	0.40	0.00	1.00
	fareast	East Asia	dummy		209	0.19	0.00	1.00
	latin	Latin Amrican country dummy	dummy		209	0.31	0.00	1.00
	oil	Oil producing countries	dummy		209	0.31	0.00	1.00
	trans	Transitional economies East Europe	dummy		209	0.33	0.00	1.00

Notes:

(1) SW: Sachs and Warner (1995); WDI98: *World Development Indicators,* The World Bank (1998).

Table 3. Results of the EBA Analysis for Growth-Related Variables

Core variables		M1		M2		M3		M4		M5		M6	
		coefficient	significance level	coefficient	significance level	coefficient	significance level	coefficient	significance level	coefficient	significance level	coefficient	significance level
lgdp85	min	..	..	..	..	..	..	-0.016	0%	-0.020	0%	-0.016	0%
	Max	..	..	..	..	..	..	-0.002	28%	-0.009	1%	-0.006	2%
sacwar95	min	..	..	0.012	4%	0.011	6%	..	..	..	..	0.006	39%
	Max	..	..	0.028	0%	0.028	0%	..	..	..	..	0.023	0%
gdi95	min	0.071	10%	..	..	0.068	13%	..	..	0.071	10%	..	..
	Max	0.231	0%	..	..	0.198	0%	..	..	0.223	0%	..	..
llfem85	min	0.039	5%	0.039	5%	..	..	-0.012	56%	..	..	..	..
	Max	0.123	0%	0.112	0%	..	..	0.096	0%	..	..	..	..
lgnp85	min	na	na	na	na	na	na	-0.016	0%	-0.020	0%	-0.017	0%
	Max	na	na	na	na	na	na	-0.002	27%	-0.009	0%	-0.006	2%
gdfi95	min	0.083	6%	na	na	0.085	5%	na	na	0.084	10%	na	na
	Max	0.235	0%	na	na	0.207	0%	na	na	0.221	0%	na	na
llifef85	min	0.030	14%	0.030	14%	na	na	-0.024	34%	na	na	na	na
	Max	0.120	0%	0.110	0%	na	na	0.095	0%	na	na	na	na
llifet85	min	0.037	6%	0.037	6%	na	na	-0.013	51%	na	na	na	na
	Max	0.124	0%	0.114	0%	na	na	0.098	0%	na	na	na	na
fareast	min	0.017	5%	0.014	14%	0.019	2%	0.017	5%	0.021	1%	0.019	3%
	Max	0.049	0%	0.034	0%	0.042	0%	0.033	0%	0.047	0%	0.034	0%
lfert85	min	-0.051	0%	-0.047	0%	-0.042	0%	-0.044	0%	-0.040	0%	-0.039	0%
	Max	-0.022	0%	-0.024	0%	-0.022	0%	0.014	15%	0.002	87%	0.009	43%
lpop85	min	0.001	53%	0.000	93%	0.000	79%	0.002	23%	0.001	53%	0.000	93%
	Max	0.009	0%	0.006	0%	0.006	0%	0.007	0%	0.008	0%	0.006	0%
popg95	min	-1.480	0%	-1.528	0%	-1.256	0%	-1.412	0%	-1.142	0%	-1.256	0%
	Max	0.368	36%	0.047	90%	-0.574	5%	-0.364	7%	-0.104	82%	-0.371	38%
oil	min	-0.020	0%	-0.019	1%	-0.011	12%	-0.019	0%	-0.021	0%	-0.018	0%
	Max	0.002	77%	0.001	88%	0.003	67%	-0.002	72%	0.002	77%	-0.001	88%
trans	min	-0.040	0%	-0.047	0%	-0.047	0%	-0.038	0%	-0.038	0%	-0.044	0%
	Max	0.004	83%	-0.005	73%	-0.016	35%	-0.002	88%	0.011	51%	-0.002	88%
latin	min	-0.022	0%	-0.013	3%	-0.019	0%	-0.014	2%	-0.020	0%	-0.013	2%
	Max	0.006	39%	0.012	7%	0.001	90%	0.007	21%	0.007	27%	0.008	20%
africa	min	-0.030	0%	-0.023	0%	-0.009	23%	-0.021	0%	-0.014	13%	-0.008	34%
	Max	0.006	38%	0.007	34%	0.008	31%	-0.016	12%	0.007	40%	0.008	33%
mgdp95	min	-0.020	7%	-0.021	8%	-0.009	35%	-0.080	1%	-0.019	8%	-0.019	8%
	Max	0.039	0%	0.020	11%	0.040	0%	0.017	18%	0.038	0%	0.019	13%
xgdp95	min	-0.011	32%	-0.015	19%	-0.004	69%	-0.016	12%	-0.014	13%	-0.015	15%
	Max	0.043	0%	0.025	3%	0.042	0%	0.063	2%	-0.013	21%	0.021	4%
open95	min	-0.007	19%	-0.009	16%	-0.003	49%	-0.009	9%	-0.008	14%	-0.009	10%
	Max	0.021	0%	0.012	6%	0.021	0%	0.010	7%	0.019	0%	0.010	10%
budg95	min	-0.002	97%	-0.002	97%	0.039	48%	-0.010	87%	0.018	76%	0.018	76%
	Max	0.255	0%	0.208	0%	0.275	0%	0.162	1%	0.252	0%	0.186	0%
tax95	min	-0.081	1%	-0.047	11%	-0.085	1%	-0.091	0%	-0.135	0%	-0.089	0%
	Max	0.063	9%	0.088	1%	0.060	8%	0.048	14%	0.032	29%	0.044	14%
infl95	min	-0.002	1%	-0.002	0%	-0.002	1%	-0.002	0%	-0.002	1%	-0.002	0%
	Max	-0.001	43%	-0.001	7%	-0.001	41%	-0.001	6%	-0.001	37%	-0.001	6%

Table 4. Parsimonious Growth Models

Regressors		M1 coefficient	M1 significance level	M2 coefficient	M2 significance level	M3 coefficient	M3 significance level	M4 coefficient	M4 significance level	M5 coefficient	M5 significance level	M6 coefficient	M6 significance level	M7 coefficient	M7 significance level
convergence:	lgdp85	-0.014	*0%*	-0.015	*0%*	-0.013	*0%*								
	lgnp85									-0.010	*0%*	-0.008	*0%*	-0.013	*0%*
human capital:	llifem85	0.055	*0%*	0.046	*2%*	0.061	*0%*			0.083	*0%*	0.087	*0%*	0.061	*0%*
	lfert85	-0.024	*0%*	-0.028	*0%*	-0.020	*8%*							-0.028	*0%*
openness:	sacwar95	0.016	*0%*	0.016	*1%*			0.017	*0%*	0.019	*0%*				
investment:	gdi95			0.143	*0%*			0.204	*0%*			0.092	*4%*		
	gdfi95					0.113	*1%*								
fareast		0.032	*0%*			0.022	*1%*			0.037	*0%*	0.029	*0%*	0.034	*0%*
constant		-0.087	*25%*	-0.065	*40%*	-0.133	*10%*	-0.040	*0%*	-0.260	*0%*	-0.302	*0%*	-0.105	*18%*
statistics															
F-test for joint significance:		F(5,77)	25.430	F(5,77)	24.150	F(6,76)	20.070	F(2,80)	26.210	F(4,78)	25.650	F(4,78)	22.390	F(4,78)	27.440
R-square:			0.623		0.611		0.613		0.396		0.568		0.535		0.585
Adjusted R-square:			0.598		0.585		0.583		0.381		0.546		0.511		0.563
Standard error of the regression:			0.016		0.016		0.016		0.020		0.017		0.018		0.017

Table 5. Goldfeld-Quandt Test for Variance Constancy with Respect to Sample Size Restrictions

H_0: Model cannot be extended to the largest possible sample size.

Model	*test statistic*	*distribution*	*probability*
M1	1.18	F(13,77)	*0.31*
M2	1.33	F(12,77)	*0.22*
M3	2.99	F(45,76)	*0.00*
M5	1.05	F(14,78)	*0.42*
M6	2.38	F(48,78)	*0.00*
M7	2.96	F(51,78)	*0.00*

H_0: Model cannot be restricted to the set of observations where ANTITRUST, UNFAIR and MRKTDOM are available.

Model	*test statistic*	*distribution*	*probability*
M1	1.59	F(52,39)	*0.07*
M2	1.22	F(51,38)	*0.22*
M3	1.67	F(34,36)	*0.06*
M5	1.43	F(53,40)	*0.12*
M6	1.57	F(36,38)	*0.09*
M7	2.06	F(36,38)	*0.02*

H_0: Model cannot be restricted to the set of observations where S30, HERF30 and AGE25 are available.

Model	*test statistic*	*distribution*	*probability*
M1	1.75	F(59,32)	*0.04*
M2	1.45	F(57,32)	*0.13*
M3	1.75	F(42,28)	*0.06*
M5	1.53	F(60,33)	*0.09*
M6	1.96	F(44,30)	*0.03*
M7	1.91	F(44,30)	*0.03*

H_0: Model cannot be restricted to the set of observations where BD-based [(1)] alternative-to-competition variables are available.

Model	*test statistic*	*distribution*	*probability*
M1	1.66	F(58,32)	*0.06*
M2	1.43	F(58,31)	*0.14*
M3	2.11	F(46,23)	*0.03*
M5	1.22	F(59,33)	*0.27*
M6	1.39	F(48,25)	*0.19*
M7	2.19	F(48,25)	*0.02*

H_0: Model cannot be restricted to the set of observations where ENTREPRENEUR is available.

Model	*test statistic*	*distribution*	*probability*
M1	1.38	F(65,25)	*0.19*
M2	1.32	F(64,25)	*0.22*
M3	1.05	F(46,23)	*0.47*
M5	1.66	F(66,26)	*0.08*
M6	1.53	F(48,25)	*0.13*
M7	1.20	F(48,25)	*0.32*

Note: BD: Burnside and Dollar (1997). These alternative-to-competition variables includes ASSAS, CIVLIB, ETHNFRCT, INSTITQUALITY and POLICY (for definitions, see Table 6).

Table 6. Definitions of Additional Variables Used in the Second Stage EBA

Variable	*Definition*	*Period*	*Source (1)*	*Obs*	*Std. Dev.*	*Min*	*Max*
ASSAS	Number of assasinations	Average 86-93	BD	71	0.7685	0.000	4.125
CIVILIB	Civil liberties	1985	BD	70	1.3545	1.000	7.000
CORRUPT	Corruption index (0 to 6, high to low)	1985	ICRG	126	1.2320	1.000	6.000
ENVRNMNT_WB	Environmental policies and regulations (2)	1998	PREM	135	0.8750	1.000	5.000
ETHNFRCT	Ethnic fractionalisation index	Average 86-93	BD	68	29.895	0.000	93.000
INSTITQUALITY	Institutional quality	Average 86-93	BD	64	1.4026	2.270	8.560
PATENTS	Number of patents granted	1995	WIPO	93	1.8E+04	0.000	1.1E+05
POLICY	Economic policy index	Average 86-93	BD	92	1.2834	-3.230	4.030
RULE_WB	Private economic activity is facilitated by a rule-based governance structure (3)	1997	PREM	130	0.8155	1.000	4.670
corruptavg	Corruption index (0 to 6, high to low)	Average 86-95	ICRG	126	1.3126	0.450	6.000
crpriv95	Credit to private sector (% of GDP)	Average 86-95	WDI98	166	0.3156	0.002	1.943
govc95	Gen. government consumption (% of GDP)	Average 86-95	WDI98	169	0.0698	0.055	0.493
govcg95	Gen. government consumption growth (% of GDP)	Average 86-95	WDI98	167	0.0687	-0.340	0.521
land85	Land (SqKm)	1985	WDI98	173	1.5E+06	20.000	9.3E+06
m1m295	M1/M2 ratio	Average 86-95	WDI98	165	0.2004	0.086	0.944
m295	Money and quasi money (M2) as % of GDP	Average 86-95	WDI98	163	0.2735	0.002	1.604
m395	Liquid liabilities (M3) as % of GDP	Average 86-95	WDI98	164	0.2860	0.003	1.715
m3m1	Quasi-liquid liabilities (% of GDP)	Average 86-95	WDI98	164	0.2771	0.001	1.562
prim2585	Percentage of primary school attained in male population older than 25	1985	BL	110	0.1695	0.073	0.740
pyrm2585	Average years of primary schooling in the male population aged 25 and over	1985	BL	110	1.8493	0.610	8.020
shpupp85	Ratio of gov. current education expend. per primary school pupil to per capita GDP	1985	BL	90	0.0851	0.029	0.449
spread95	Interest rate spread (lending rate minus deposit rate)	Average 86-95	WDI98	144	1.4944	-0.029	16.939

Notes:

(1) BD: Burnside and Dollar (1997); BL: Barro and Lee (1996); WDI98: The World Bank (1998); ICRG: *International Country Risk Guide,* The Political Risk Services Group (1998); PREM: confidential internal assessments by staff economists, The World Bank; WIPO: World Intellectual Property Organisation (1997).

(2) on a 1-6 scale where 2 = no policies or investments for sustainable management of natural resources or pollution control, regulations inadequate or weakly enforced; 5 = comprehensive policies accompanied by credible enforcement capacity to sustainably manage key natu resources, regulations consistent with international norms implemented effectively

(3) on a 1-5 scale where 1 = laws and regulations lack certainty and application lacks predictability, property rights not well-defined or enfor 3 = credible reform process underway, limited discretion; 5 = well-functioning legal and regulatory system with low transactions costs, confli of interest regulations for public servants strictly enforced.

Table 7. Correlation Matrix for Residuals and Competition Variables

			residuals from					
			M1	M2	M3	M5	M6	M7
	Variables	# of obs.	102	101	83	102	83	83
Competition Policy Variables	ANTITRUST	52	0.2826		0.3891*	0.3815*	0.4870*	0.3474*
	BUSFREE1	115				0.1758	0.1854	
	BUSFREE2	115				0.1775	0.1903	
	DISTRIBUTION_WB	130					0.2128*	
	PCONTROL	112			0.2517*	0.2237*	0.2990*	0.2142*
	PRODUCTMRKT_WB	130						
Structural Variables	UNFAIR	49	0.2626		0.5091*		0.4379*	0.4692*
	MRKTDOM	52		0.2738		0.3390*		
	S30	53						
	HERF30	59						0.2531
	SOE1	49						
	SOE2	103		0.2048	0.2348*		0.1944	
Mobility Variables	AGE25	42		-0.3031				-0.2920
	ENTREPRENEUR	43			0.3555*		0.2793	0.3239
Alternative variables that could potentially explain residual growth	ASSAS	71						
	CIVILLIB	70						
	CORRUPT	124						
	ENVRNMNT_WB	130	0.2004		0.3030*		0.3295*	0.3794*
	ETHNFRCT	68						
	INSTITQUALITY	64						
	PATENTS	93						
	POLICY	94		0.2454	0.2626*		0.2553*	0.2666*
	RULE_WB	130						

Note: Table shows correlations that are significant at 10%, star indicates significance at 5%.

Table 8. ETA Results: Robustness of Competition and Other Variables

			M1		M2		M3		M5		M6		M7	
			coef.	signifi-cance	coef.	signifi-cance	coef.	signifi-cance	coef.	signifi-cance	coef.	signifi-cance	coef.	signifi-cance
Competition Policy Variables	ANTITRUST	min	0.007	8%	0.005	23%	0.007	0%	0.009	3%	0.010	2%	0.006	9%
		max	0.010	1%	0.009	5%	0.010	2%	0.014	0%	0.014	0%	0.009	2%
	BUSFREE1	min	0.000	80%	-0.001	64%	0.000	84%	0.001	43%	0.001	45%	0.000	90%
		max	0.003	7%	0.002	19%	0.003	9%	0.003	4%	0.004	2%	0.003	5%
	BUSFREE2	min	0.000	80%	-0.001	64%	0.000	84%	0.001	43%	0.001	45%	0.000	90%
		max	0.003	7%	0.002	19%	0.003	9%	0.003	4%	0.004	2%	0.003	5%
	DISTRIBUTION_WB	min	-0.010	14%	-0.010	17%	-0.010	18%	-0.006	41%	-0.006	44%	-0.010	18%
		max	0.001	84%	0.000	95%	0.003	67%	0.005	50%	0.008	32%	0.005	50%
	PCONTROL	min	0.000	74%	-0.001	54%	0.000	80%	0.000	89%	0.000	85%	-0.001	60%
		max	0.002	11%	0.002	13%	0.002	6%	0.002	8%	0.003	3%	0.002	10%
	PRODUCTMRKT_WB	min	0.004	55%	0.005	53%	0.007	30%	0.004	59%	0.008	33%	0.006	41%
		max	0.014	2%	0.014	3%	0.019	0%	0.013	6%	0.019	1%	0.018	1%
	UNFAIR	min	0.007	8%	0.004	36%	0.008	3%	0.003	46%	0.005	24%	0.007	5%
		max	0.010	0%	0.009	4%	0.013	0%	0.009	3%	0.011	1%	0.013	0%
Structural Variables	MRKTDOM	min	0.003	40%	0.005	33%	0.001	75%	0.006	16%	0.003	44%	0.001	84%
		max	0.009	2%	0.011	2%	0.009	3%	0.014	0%	0.014	0%	0.007	8%
	S30	min	-0.004	78%	-0.018	18%	-0.008	55%	0.001	97%	-0.002	90%	0.000	97%
		max	0.009	40%	0.003	85%	0.009	44%	0.010	38%	0.009	43%	0.013	25%
	HERF30	min	0.000	40%	0.000	76%	0.000	73%	0.000	33%	0.000	60%	0.000	42%
		max	0.000	19%	0.000	67%	0.000	33%	0.000	15%	0.000	31%	0.000	14%
	SOE1	min	-0.065	10%	-0.064	11%	-0.066	13%	-0.070	10%	-0.079	11%	-0.073	12%
		max	0.058	26%	0.055	23%	0.033	54%	0.053	35%	0.023	71%	0.042	36%
	SOE2	min	0.001	62%	0.001	46%	0.000	85%	0.000	98%	0.000	73%	0.000	72%
		max	0.003	2%	0.003	1%	0.003	1%	0.002	15%	0.002	15%	0.003	1%
Mobility Variables	AGE25	min	-0.001	2%	-0.001	2%	-0.001	4%	0.000	15%	0.000	24%	-0.001	4%
		max	0.000	16%	0.000	8%	0.000	42%	0.000	37%	0.000	72%	0.000	28%
	ENTREPRENEUR	min	-0.011	62%	-0.014	58%	-0.007	78%	-0.020	35%	-0.022	35%	-0.007	77%
		max	0.018	45%	0.017	44%	0.026	26%	0.004	84%	0.008	72%	0.022	35%
Alternative variables that could explain residual growth	ASSAS	min	-0.004	29%	-0.005	23%	-0.004	37%	-0.003	40%	-0.004	43%	-0.005	29%
		max	0.001	85%	-0.001	83%	0.002	60%	0.000	94%	0.002	66%	0.001	71%
	CIVILIB	min	-0.004	8%	-0.003	33%	-0.005	9%	-0.004	16%	-0.004	17%	-0.005	10%
		max	0.000	93%	0.002	44%	0.000	99%	0.000	96%	0.001	84%	0.000	95%
	CORRUPT	min	-0.003	10%	-0.002	41%	-0.004	7%	-0.002	33%	-0.003	24%	-0.005	4%
		max	0.002	31%	0.002	33%	0.002	18%	0.002	22%	0.003	14%	0.002	29%
	ENVRNMNT_WB	min	0.003	53%	0.004	37%	0.005	24%	0.004	49%	0.006	29%	0.002	59%
		max	0.010	5%	0.011	5%	0.014	1%	0.011	5%	0.016	1%	0.013	2%
	ETHNFRCT	min	0.000	7%	0.000	12%	0.000	10%	0.000	11%	0.000	17%	0.000	10%
		max	0.000	62%	0.000	44%	0.000	52%	0.000	44%	0.000	32%	0.000	59%
	INSTITQUALITY	min	-0.002	42%	0.000	85%	-0.003	12%	-0.001	70%	-0.003	23%	-0.003	12%
		max	0.005	10%	0.006	9%	0.005	16%	0.005	9%	0.005	16%	0.005	13%
	PATENTS	min	0.000	4%	0.000	12%	0.000	8%	0.000	11%	0.000	16%	0.000	10%
		max	0.000	92%	0.000	90%	0.000	50%	0.000	99%	0.000	24%	0.000	53%
	POLICY	min	0.001	43%	0.002	18%	0.001	45%	0.001	64%	0.001	77%	0.001	54%
		max	0.007	0%	0.007	0%	0.008	0%	0.006	0%	0.008	0%	0.008	0%
	RULE_WB	min	-0.004	47%	-0.005	37%	-0.001	81%	-0.003	60%	-0.001	90%	-0.001	80%
		max	0.008	14%	0.006	29%	0.011	5%	0.010	8%	0.014	2%	0.011	4%

Note: Table reports the maximum and minimum coefficient estimates from EBA analysis and their significance levels for each model.

Table 9. Anti-Trust and Residual Growth Rates

A. LATIN AMERICAN SOUTHERN CONE COUNTRIES

	AGE25	*ANTITRUST*	*RESIDUAL GROWTH*
Chile	10.52	4.71	3.25%
Brazil	50.16	3.91	0.03%
Argentina	20.96	3.06	-0.08%
		3.89	1.07%

B. EMERGING EU COUNTRIES

	AGE25	*ANTITRUST*	*RESIDUAL GROWTH*
Ireland	29.32	4.87	2.91%
Portugal	27.8	4.45	0.77%
Spain	50.6	4.08	0.03%
Greece		3.92	-1.53%
		4.33	0.01

C. SMALL EUROPEAN ECONOMIES

	AGE25	*ANTITRUST*	*RESIDUAL GROWTH*
Norway		5.27	1.26%
Denmark	48.04	4.88	0.66%
Austria	33.64	4.76	0.39%
Belgium	48.72	4.59	0.45%
Iceland		3.67	0.37%
Netherlands	37.72	5.42	0.33%
Finland		4.23	-0.05%
Sweden	29.32	4.71	-0.43%
Luxembourg		4	-0.46%
		4.53	0.00

D. ASIAN TIGERS

	AGE25	ANTITRUST	RESIDUAL GROWTH
Korea, Rep.	23.52	3.79	1.84%
China	24.12	4.73	0.95%
Thailand	22.32	3.06	0.60%
Indonesia	21	3.25	0.17%
Malaysia	10.92	3.38	-0.14%
Hong Kong, China	10.52	3.5	0.04%
Singapore	14	4.48	-0.19%
Philippines	31.48	4	-1.36%
		3.77	0.00

TRANSITION ECONOMIES(1)

	AGE25	ANTITRUST	RESIDUAL GROWTH
Poland		3.42	-1.37%
Hungary		4.01	-2.62%
Slovak Republic	40.64	3.55	-3.08%
Czech Republic	59.72	4.01	-3.35%
Russian Federation		2.78	-6.56%
		3.55	-0.03

Table 9. Anti-Trust and Residual Growth Rates

ANGLO-AMERICAN ECONOMIES	AGE25	ANTITRUST	RESIDUAL GROWTH
United States		5.09	0.78%
United Kingdom	44.52	5.39	0.47%
Australia	25.4	4.58	0.23%
Canada	41.28	5.03	-0.43%
New Zealand	33.2	5.11	-0.63%
		5.04	0.00
LEFTOVERS			
Israel	18.96	4.83	1.77%
India	28.92	3.82	1.68%
Turkey		3.3	1.42%
France	32.96	4.25	0.59%
Egypt, Arab Rep.		3.43	0.55%
Italy	32.64	3.86	0.22%
Colombia		2.33	-0.23%
Switzerland		4.29	-0.41%
Zimbabwe	33.84	2.59	-0.48%
Venezuela		3.66	-0.53%
South Africa	39.84	3.26	-0.59%
Japan	39.56	4.52	-1.66%
Peru	29.6	3.95	-1.94%
Mexico	20.6	4.15	-2.29%
Jordan		2.13	-3.44%

Notes:

(1) For transition economies, the EBRD publishes annually a 'transition indicator' for competition policy (ANTITRUST). For the years 1995 and 1996, Poland, Hungary, Slovak Republic and Czech Republic were each assessed 3 and Russia 2, on a scale from 1 to 4+. See Transition Report for 1995 and 1996.

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